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(19) **United States**(12) **Patent Application Publication****Ching et al.**(10) **Pub. No.: US 2015/0008483 A1**(43) **Pub. Date: Jan. 8, 2015**(54) **FIN STRUCTURE OF SEMICONDUCTOR DEVICE**(71) Applicant: **Taiwan Semiconductor Manufacturing Company, Ltd.**, Hsin-Chu (TW)(72) Inventors: **Kuo-Cheng Ching**, Zhubei City (TW); **Chih-Hao Wang**, Baoshan Township (TW); **Zhiqiang Wu**, Chubei (TW); **Carlos H. Diaz**, Mountain View, CA (US); **Jean-Pierre Colinge**, Hsin-Chu City (TW)(21) Appl. No.: **13/934,992**(22) Filed: **Jul. 3, 2013****Publication Classification**(51) **Int. Cl.**  
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(57)

**ABSTRACT**

The disclosure relates to a fin field effect transistor (FinFET). An exemplary FinFET comprises a substrate comprising a major surface; a fin structure protruding from the major surface comprising a lower portion comprising a first semiconductor material having a first lattice constant; an upper portion comprising the first semiconductor material having the first lattice constant; a middle portion between the lower portion and upper portion, wherein the middle portion comprises a second semiconductor material having a second lattice constant different from the first lattice constant; and a pair of notches extending into opposite sides of the middle portion; and an isolation structure surrounding the fin structure, wherein a top surface of the isolation structure is higher than a top surface of the pair of notches.

